

~~WIDE-ANGLE~~



Docket #71257

**WIDE-ANGLE CONSTANT-VELOCITY JOINT, ~~IMPROVED TO~~
~~EXTEND~~
~~LUBRICATION TIME AND REDUCE THE LOSS OF~~
~~LUBRICANT~~
~~DESCRIPTION~~**

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of priority under 35 U.S.C. § 119 of Italian
Application FI2003 A 000001 filed January 3, 2003.

5

FIELD OF THE INVENTION

[0002] The invention relates to a constant velocity joint - especially for
5 wide-angle applications - which is improved in order to achieve the objects
of: extending the life of the grease lubrication of the joint and hence
increasing the time between one injection and the next; and minimizing the

loss of lubricating grease.

[0003] These and other objects and advantages will become clear from the text which follows.

BACKGROUND OF THE INVENTION

[0004] The constant-velocity joint is of a conventional type that comprises two forks forming input and output members of the joint, two spiders, and a central core forming a housing for sliding movement - in a transverse plane - for at least one basically discoidal constraint member that forms the seats for the spherical end heads of the two forks; said constraint member moves about in a transverse plane of symmetry of the central core, to which two surfaces of said housing are parallel. Frequently between each of said two surfaces and the opposing face of said constraint member a laminar ring is interposed, resulting in continuous annular contact with said surface and with said opposing face of the constraint member. This is done in an effort to reduce the loss of lubricating grease, which is mostly there to lubricate between the spherical heads and their seats.

SUMMARY OF THE INVENTION

[0005] To maintain the functionality of said laminar rings, according to the invention said laminar rings are of an elastic material and shaped as Belleville washers (diaphragm springs), in which the outer edge bears and

_presses continuously on said surface and the inner edge bears and
_presses continuously against the opposing face of the constraint member.
_Advantageously, both of said laminar rings are of an elastic metal and
_shaped as Belleville washers, in order to press as stated above.

5

30-**[0006]** A clearer understanding of the invention will be gained from the
_description and attached drawing, the latter showing a practical nonrestrictive
_example of the invention. ~~In the drawing:~~

10 **[0007]** The various features of novelty which characterize the invention are pointed out
with particularity in the claims annexed to and forming a part of this disclosure. For a better
understanding of the invention, its operating advantages and specific objects attained by its uses,
reference is made to the accompanying drawings and descriptive matter in which preferred
embodiments of the invention are illustrated.

15

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] In the drawings:

[0009] Figs 1 and 2 show a constant-velocity joint in longitudinal section, in
20 _two positions which it is capable of assuming;

[0010] Fig. 3 shows certain components of the said joint in an exploded view; and

[0011] Figs 4 and 5 show in isolation one of two laminar sealing rings according to the invention, in end view and in section taken on V-V as 5 marked in ~~fig~~Fig. 4.

The DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0012] Referring to the drawings in particular, the appended drawing (Figs 1 and 2)

illustrates a wide-angle

constant-velocity joint. Reference 1 denotes a tubular component of a

telescopic shaft, which ends in a wide-angle constant-velocity joint 5. The

telescopic shaft 1 may be fitted with a protective sheath. The ~~constant-~~

~~to velocity~~constant-velocity joint 5, which is of the wide-angle type, comprises a power

coupling member 9, for the input or output of the joint, which forms a

splined seat 9A for connection to a drive member with which the ~~constant~~velocity

constant-velocity joint is combined. The member 9 is integral with the base ~~to A~~10A of a

fork 10 forming part of the said joint 5. The telescopic shaft ~~to~~ 11 is engaged on

~~to~~ a member 12 integral with the base 14A of a fork 14 belonging to the said

constant-velocity joint. Each of the two forks 10 and 14 possesses a

terminal crosspiece IOC, 14C, from which a spherical head ~~to B~~10B, 14B

projects. Said two spherical heads are opposed to each other. The

constant-velocity joint also includes a central core 16, consisting of two
20 parts that are more or less symmetrical about a plane lying transversely
relative to the general axis of the joint, when the input and output
components of the members 9 and 12 are lined up with each other. Said
5 two parts of the member 16 are joined to each other at 16s by welding, or
by other means, such as bolts. The central core 16 has two opposing pairs
25 of projections 16A1 the projections of each pair forming seats in which a
respective spider 18 can rotate. Each spider 18 is further pivoted to the
corresponding fork 10, 14, respectively, described above. The arrangement
10 described above gives a typical constant-velocity joint, which is further
completed by a constraint member 20 of discoidal shape having a central
30 circular cylindrical through seat 20A, in which the opposing spherical heads
10B 10B, 14B of the two forks 10 and 14 are received. The discoidal constraint
member 20 is housed in such a way that it can slide inside a discoidal
15 housing 24, which is formed by two parallel opposing walls 24A, 24B
formed by the two components of the central core 16. These two

= 3 =

components are suitably machined and welded at 16s or otherwise joined
together to imprison the discoidal constraint member 20, 20B in such a way
20 as to allow it to move about. The central core 16 is fitted with a grease
nipple 28, which reaches the discoidal housing 24 via the discoidal
5 constraint member 20. This member 20 has at least one radial hole 30 for

communication between the housing 24 and the through seat 20A. This enables lubrication of the sliding surfaces 24A, 24B and the discoidal constraint member 20, and between the through seat 20A and the spherical heads 10B, 14B.

5

[0013] The above description was of an example of a shaft with a known type of constant-velocity joint, of the kind capable of transmitting drive even through a large angle, such as the angle θ° as shown in Fig. 2, the purpose of which is well known. There are frequently two laminar rings 40 which are flat and are interposed between the surfaces 24A and 24B and the two faces of the discoidal constraint member 20, to reduce the loss of lubricating grease from the discoidal housing 24 to the exterior, whereas efficient lubrication is required between the spherical heads 10B and 14B and the seat 20A for these.

15

[0014] In the conventional versions, the efficiency against the leakage of lubricating grease obtained with these flat laminar rings 40 is limited, which therefore requires frequent supply of grease from the grease nipple in order to ensure a sufficient lubrication between the cylindrical inside surface of the through seat 20A and the spherical heads 10B and 14B, so that the joint does not rapidly become unusable.

20

25 **[0015]**

According to the invention, and as is clear in Figs 3 and 5, the

laminar rings 40 (of Figs 1 to 5) are used in the form of Belleville washers (diaphragm springs) made of an elastic material, particularly a spring metal.

5 **[0016]**

As can be seen in Fig. 3, when the two laminar rings 40 are inserted

between each of the faces of the discoidal constraint member 20 and the

surfaces 24A and 24B, before connecting the two parts of the central core

16 by welding them at 16S, the two rings 40 are more or less compressed

and deformed axially, causing the internal edges 40B to press with

10 continuity against the corresponding face of the member 20 and the outer

edges ~~40C~~40A to press with continuity against the respective surfaces 24A and

= 4 =

24B. The effect is to sharply reduce the loss of lubricant between said

surfaces 24A, 24B and the faces of the discoidal member 20, and the

15 lubrication is sustained for a very long period between the spherical heads

~~108~~ 10B, 14B and the seat 20A, obviating the need for frequent injections of

5 grease from the grease nipple 28. Besides keeping the constant-velocity

joint running, it also consumes less lubricant and greatly reduces the

environmental pollution which would occur with leaking lubricant.

20

[0017]

In an alternative embodiment, it is possible to have only one laminar

ring 40 shaped as a Belleville washer and the other flat and stressed - by

to the same Belleville washer ring 40 - to press against the surface of the core
and against the face of the constraint member 20. This is functional enough
for the purposes of lubrication and joint life.

5 [0018] It will be understood that the drawing shows only an example
provided purely as a practical demonstration of the invention, which latter
15 may be varied in its shapes and arrangements without thereby departing
from the scope of the concept on which the invention is based. The
presence of any reference numbers in the appended claims is for the
10 purpose of facilitating the reading of the claims with reference to the
description and drawing, and does not limit the scope of protection
20 represented by the claims.

~~=5=~~

What I claim is:

15 ~~1. Wide-angle constant-velocity joint comprising two forks forming
input and output members of the joint, two spiders, and a central core
d forming a housing for sliding movement in a transverse plane for at least
5 one basically discoidal constraint member forming seats for the spherical
end heads of the two forks, which constraint member moves about when in
20 use in a transverse plane of symmetry of the central core, to which two
surfaces of said housing are parallel, between each of which two surfaces
and the opposing face of said constraint member a laminar ring is~~

10 interposed, resulting in continuous annular contact with said surface and
with said opposing face of the constraint member, wherein at least one of
said laminar rings is of an elastic material and shaped as a Belleville
washer (diaphragm spring), which bears via its outer edge on said surface
5 and via its inner edge against the opposing face of said constraint member.

15 2. Constant-velocity joint according to claim 1, wherein both of said
laminar rings are of an elastic material and shaped as Belleville washers.

=6=

10 "WIDE-ANGLE CONSTANT-VELOCITY JOINT, IMPROVED TO EXTEND
LUBRICATION TIME AND REDUCE THE LOSS OF LUBRICANT"
ABSTRACT

5

15 [0019] While specific embodiments of the invention have been shown and described in
detail to illustrate the application of the principles of the invention, it will be understood that the
invention may be embodied otherwise without departing from such principles.

ABSTRACT OF THE DISCLOSURE

The joint comprises two spiders 18 and a central core 16 forming a housing
24 for the sliding movement - in a transverse plane - of a basically discoidal
constraint member 20 forming the seats 20A for the spherical end heads
1 OC, 14C of the two forks. The constraint member 20 moves about inside
5 ~~to said~~ the housing 24. Between each of ~~said~~ the two surfaces 24A, 24B and the
opposing face of ~~said~~ the constraint member 20, an ~~elastic~~ elastic laminar ring 40
shaped like a Belleville washer is interposed, its annular edges being in
continuous annular contact with ~~said~~ the surface 24A or 24B and with ~~said~~
the opposing face of the constraint member 20.

15

(Fig. 2)